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Original Articles.

FEVER.

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BY the term fever in this paper I mean a disorder or derangement of the temperature of the body. This will include the experimental fever with high temperature and increased thermogenesis, the exceptional cases where we have high temperature with diminished thermogenesis, and the experiments where we have subnormal temperature and a thermogenesis increased equal to a similar period on the food-day, as in Exp. 4.

Senator first studied thoroughly experimental fever with the calorimeter. He concluded that in the first stage of fever the discharge of heat is rather diminished than increased, so that at this period it is probable there is an abnormal retention. As the febrile process progressed towards its height, fluctuations exhibited themselves in the quantity of heat liberated which resembled those observed in the discharge of carbonic acid and aqueous vapor, but it could not be determined whether the amount of heat given off during the whole course of the fever was greater or less than the quantity of heat given off during the same period of apyrexia. Dr. Burdon Sanderson, in a commentary on this statement, remarks that in judging of the significance of the fact last stated it must be borne in mind that the normal with which the febrile thermogenesis is here compared is that of inanition. In the dog, when on adequate diet, the production of heat is at least fifty per cent. more active. If therefore we were to take the animal in the ordinary condition of nourishment as our standard of comparison, we should find the heat production in fever very considerably diminished. Senator's experiments upon dogs were made as follows: each animal was placed for a sufficient time on horseflesh, which was increased or diminished until the body weight and daily discharge of nitrogen in urea and the "insensible" loss became severally constant. The diet was then continued as before until nitrogen equilibrium was once more established. This having been accomplished, fever was induced by the subcutaneous injection of perfectly fresh pus, and determinations of the same kind as had been previously made were repeated under exactly similar conditions as regards nutrition during a second period of forty-eight hours. Each experiment therefore comprised forty-eight hour periods of observation, separated from each other by an interval of several days, during which periods the production of heat, the changes of bodily weight, the daily quantities of urine and urea excreted, and respiratory and cutaneous discharges of carbonic acid and water, were determined. The carbonic acid determinations and the calorimetric observations, however, only related to limited periods of measurement each lasting an hour, repeated once or twice during the day. In only one series of calorimetric observations was the heat production measured for four hours, of which three were consecutive and the fourth separated by a four hours' interval. The calorimetric observations should have been made more frequently during the day to be of marked value.

Prof. Wood has made a number of experiments, running over about three-fourths of a day for four consecutive days. He mainly used dogs, and usually produced fever by the injection of putrid blood into the veins. The blood was injected at the end of the second day, which was the first hunger day, and he studied the fever for two consecutive days. In the pyæmic fever of dogs the H. P. was usually in excess of H. P. of fasting dogs, but less than that which could have been produced by high feeding. Usually the production of animal heat rose in the febrile state with the temperature and with the stage of fever, but sometimes H. P. became very excessive, although the temperature of the body remained near the normal limit. In rabbits with pyæmic fever, H. P. seemed to be even greater than in health. His experiments were well calculated to determine the increase of H. P. in fever, but would have been more accurate if exactly similar periods of observations were compared on normal and fever days, on account of the hourly changes in H. P. due to rhythm.

Finkler[1] has made a most exhaustive study of experimental fever. He measured the oxygen consumed and the carbonic acid given off, and compared these with a time-unit and the weight of the animal. From his experiments the law is deduced that the consumption of oxygen is greater during the fever elevation of temperature than takes place in animals not feverish under like conditions of food and surrounding temperature. He also thinks that in fever there is increase of carbonic acid given off due to increased production. When the oxidation passes through the three phases of increase, continuance at a height and decrease, it corresponds only in a general way to elevation, continuance at a height, and decrease of temperature. Finkler arrived at the conclusion that fever is a neurosis, mainly a disease of the nervous system regulating the temperature. Pflüger's theory to explain the regulation of heat is as follows: An automatic centre which presides over the production of heat and another centre which acts upon the automatic centre as an inhibitory apparatus, and on its side stands in connection with the temperature nerves of the skin and is set into activity through the action of heat, so that coldness in general is not an irritant. When the excitation of the inhibitory centre slackens, then the automatic centre enters into activity, so that coldness of the skin corresponds to lessened formation of heat. Finkler explains the action of these centres in fever as follows: Intense increased oxidation destroys the substance generating fever. The chilly feeling and contraction of the capillaries denotes increased heat production, that in the first stage of fever a stronger excitation of the automatic centre takes place, because the nerves of the inhibitory centre are in a more or less paralytic state. In the second stage of fever, when the temperature of fever is constant, the relations of the two centres are changed. The production of heat remains as in previous stage, increased to about the same extent. In the decrease of the fever oxidation sinks below normal.

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[1] Pflüger's Archiv., 1882.

A rhythm of H.P. and H.D.exists in fever,hence all calorimetric observations should be made at the same time of day on successive days; the length of time the animal remains in the calorimeter each day should be the same; the calorimeter in observations on successive days should be nearly at the same temperature and the external temperature should be about a degree above that of the calorimeter. To produce experimental fever there are several agents which may be used. Thus solutions of hæmoglobin, albumose, peptone, fibrin-ferment, neurine, sour milk, papayotin, sulphate of ammonium and large quantities of water when injected cause experimental fever. I selected putrid blood, as it gives a fever lasting for a considerable period. My experiments were made upon rabbits and cats. In one series hourly observations were taken every six hours during the day and night, on the four successive days, the first day food being withheld as on the successive days. At the end of the second day putrid blood was injected subcutaneously or by the jugular vein, or in both ways. In another series observations were made for the first three hours, then at the sixth, eighth and twenty-fourth hour at similar periods of the successive days. I did not permit the animal to remain in the calorimeter over three hours at longest, as I feared the condition of the animal would become abnormal, although it is true the abnormality would probably be the same in each period of successive days. The calorimeter used was d'Arsonval's, and with each degree of temperature the air is above that of the calorimeter, the error was .025 F. The air was aspirated through the hollow coil, lying in the water chamber by means of Voit's respiration apparatus, and the amount drawn through the calorimeter given in litres. The amount of heat given to or taken from the air was not calculated, as it is small and would not have changed the result. Any one who wishes to can make the calculations, as the data are given, and satisfy himself on that point. In Exp. I., the normal average temperature on the second day, or hunger day, was 102° F., and on the first fever day the average temperature was 104° F., and H. P. was decreased 7.75 thermal units; on second fever day the average temperature was 103.7, and the decrease of H. P. was 5.0 thermal units. H. D. was decreased on the first fever day 8.0 units, and on second day 6.0 units. There was on second fever day in the morning period an increase of 2.0 units of H. P. over the same period of hunger day.

In Exp. 2, the average normal temperature on hunger day was 102.3° D., and on first fever day the temperature was 103.8°, with an increase of H. P. of 1.5 units and of H. D. of 1.3 units. On the second fever day the average temperature was 103.6°, and H. P. was decreased 2.5 and H. D. 2.7 units.

In Exp. 3, on hunger day the average temperature was 102.4°, and on first fever day 101.7, H. P. was decreased 4.2 and H. D. 6.8 units. On second fever day the temperature was 97.5° F., and H. P. was decreased 8.2 and H. D. 6.5 units.

In Exp. 4 the temperature on hunger day was 101.4, and on first fever day 101.4, with an increase of H. P. 1.2 and of H. D. 2.0 units.

On second fever day the temperature was 99°, with a decrease of H. P. 0.5 and H. D. .03 units.

In Exp. 5, the average temperature on hunger day was 101.7°, and on first fever day a temperature 102.8, with an increase of H. P. 1.0 and of H. D. a decrease of 5.0 units.

In Exp. 7, the normal temperature was 100.6, and on first fever day the temperature was 100.9, whilst H. P. was decreased 4. and H. D. 1.0 units.

In Exp. 8, the normal temperature was 100.7, and on first fever day a temperature of 102.2, with an increase of H. P. 1.2 and of H. D. 2.1 units.

On second fever day an average temperature 102.8°, with a decrease of 4.2 of H. P. and 4.0 of H. D. in units.

In Exp. 9, on hunger day an average temperature of 100.5 and on first fever day a temperature 102.6, with an increase of H. P. 5.1 and H. D. 3.0 units.

On second fever day, H. P. was increased 3.0 and H. D. decreased 3 units, whilst the average temperature was 102.7.

In the following table these experiments are summarized so that the increase or decrease of H. P. is given on the first and second fever days.

+ means increase, — decreased production.

	1st fever day. Increase and decrease of units of H. P. compared with the 2d normal day.	*2d fever day.* Increase and decrease of units of H. P. compared with the 2d normal day.
Exp. 1	— 7.75	— 5.0
" 2	+ 1.15	— 2.5
" 3	— 4.0	— 8.2
" 4	+ 1.2	— .50
" 5	+ 1.0	
" 7	— 4.0	
" 8	+ 1.2	— 4.2
" 9	+ 5.1	+ 2.4

By an examination of this table it is seen that five show increased heat production, whilst three indicate a decrease, on the first day.

On the second day H. P. was decreased in all except one. This is partly to be explained by food being withheld on the 1st day of the experiment.

As regards H. D. in four experiments, it was increased, and in four decreased. On second fever day it was diminished in all. At only one period of the experiments did the fever increment equal the H. P. of the first day of experiment. If, however, as in Exp. 10, on the first hunger day the H. P. and H. D. are taken for an hour, and then two drops of putrid blood are directly injected, H. P. will be increased during the next four successive hours and H. D. will also be found to be increased for the next two hours.

If Senator's experiments are taken and tabulated in a similar manner, we will have the following table. + means increased H. P., — indicates decreased H. P.

Seveu days.	*1st day.*	*2d day.*	*3d day.*
Observation 1	— 0.86	+ .8	
" 2	— 0.28	— 1.75	
" 3	— 2.73	— 2.65	0
" 4	+ .92	+ 1.62	— .81
" 5	— .34	+ 2.55	
" 6	+ 1.28	— .89	
" 7 A.M.	— .06	A.M. — .99	A.M. — .94
" 7 P.M.	+ 1.34	P.M. + 2.44	P.M. — 1.49

A glance at the table will show that it would be impossible to draw any conclusions from them, either as to increment or decrement of H. P., a conclusion to which he also came. However, they seemed to show that primarily in fever H. P. is lessened. His results are due to using blood subcutaneously, which gave him a slight fever, and not continuing his observations long enough.

If Prof. Woods' results are tabulated in a similar way, they will be found as follows:

+ means increased H. P., — decreased H. P., compared with the second day.

	H. P. 1st fever day.	*H. P. 2d fever day.*
Exp. 110	+ 26	+ 31
" 111	+ 2	+ 5
" 112	— 6	+ 8
" 113	— 3	+ 18
" 114		+ 37
" 116	+ 3	

An examination of Prof. Wood's results show on the first fever day an increase of H. P. in three experiments, and a decrease of H. P. in two. On second fever day there is an increase in five.

These increments are much greater than those found by me, and are partly due to observations made at dissimilar parts of the day, without regard to the diurnal rhythm.

My animals were deprived of food twelve hours before any observation had been started. His were fed during the first day, and in a few on the second day. The amount of fever as measured by the thermometer was about the same in the experiments of Dr. Wood and in mine.

All these experiments tend to the same conclusion, that experimental fever is accompanied by an increased production of heat as a rule.

Exceptionally production is decreased.

In Fig. 1 (Exp. 9) is a delineation of the access of fever, it having been studied during the first three hours and at intervals afterward. It shows that after injection per jugular of two drops of putrid blood, the heat production rises rapidly and attains its height some hours before the fever curve attains its height. At the same time the curve of H. D. is lagging behind the curve of H. P., although following it in its upward ascent. After a while the H. P. curve falls temporarily beneath the curve of H. D. and the temperature curve falls. It will be seen normally and during the fever in the curve of H. P. that it exhibits fluctuations, a fact pointed out by Senator. The fluctuations of H. P. are greater in fever. I believe the fluctuations are due to the action of external agencies upon the thermotaxic, thermogenetic and thermolytic apparatus, which are playing at see-saw, at one time making H. P. greater than H. D., at another making H. D. greater than H. P.

In Fig. 2 (Exp. 1) there is an illustration of a high temperature, although H. P. and H. D. have fallen below normal of the hunger day or second day. In Exp. 4, we see that during three-fourths of the last fever day the temperature is below normal, and at the last observation H. P. is five units greater than those of same period on hunger day. The question arises how is Fig. 2 to be explained?

Dr. Donald McAlister has given an explanation of this. Suppose a tall vessel containing water, the level of the water representing temperature. Let two pipes be connected with this vessel, one conveying water, the other carrying it off. Let the inlet and exit tubes be each provided with a stop-cock, and let the two stop-cocks be connected by a rigid link which insures that they always turn together and by the same amount. If to start with, the inflow and outflow are equal, then however I move the linked stop-cocks, the height of the water will be the same. Now remove the rigid link and connect the stop cocks by a spiral spring. If now you move the inflow stop-cock so as to increase the flow, the outflow one will not at once follow, and, the balance being broken, the level of water will rise. But shortly the elasticity of the spring comes into activity, the outflow is equal to the inflow and the rise will cease, but the new high level will be maintained. Every movement of either stop-cock will affect the level, which will fluctuate accordingly, but its height at any moment will not be an index of the amount of inflow at that moment, The inflow may be slight while the level is high. If now you substitute H. P. for inflow and H. D. for outflow, and the rigid link will represent the healthy thermotaxic mechanism, then when this is weakened or relaxed or broken the steadiness of the normal level is impossible.

Fig. 2 amply sustains this explanation. I have tried to determine what part of the thermal apparatus is the most essential for the development of fever. The skull of rabbits, under ether, has been trephined and part of the vault broken away, then all the cortex accessible destroyed with a blunt probe without disturbing the basal ganglia. After the animal recovered from the ether and shock, putrid blood was injected by the jugular, and still fever ensued. Recently Dr. Sawadowski has published a note proving that after removal of the corpora striata in dogs, putrid blood per jugular could not cause fever. He also demonstrated that antipyrin exerted its action through the corpora striata, for upon their removal no antipyretic effect was noticed. I have made a series of experiments upon this subject, and generally noted that after extirpation of the anterior ends of the corpora striata and the injection of putrid blood, a rise of temperature. If the striate bodies are completely extirpated, there is usually no rise by putrid blood. However, I have been fortunate enough in one experiment (14) to obtain a rise of half a degree, after removal of the striate bodies, by injections of putrid blood. Notwithstanding the shock by removal of these bodies, the other basal centres will still respond to the septic poison. This rise is not due to simple extirpation of corpus striatum, for after the operation the temperature falls in rabbits for several hours.

It now remains to consider how far these facts are supported by clinical experience. Liebermeister sought to determine the H. D. in man by placing fevered persons in cold baths and noting the amount of heat given to the water. He calculated the amount of cooling which the water would undergo without the patient during the same time the patient was in it. This method is liable to many errors, which he sought to overcome in part. The loss of heat to the air and from the lungs could not be noted. He arrived at the conclusion that when baths of the same temperature are employed "without exception the loss of heat in the fever patient is greater than in the well person. The recent experiments of Fredericque and Quinquad prove that the cold bath itself increases H. P. and necessarily H. D. Prof. Leyden attempted the solution of the problem in a different manner upon patients affected with relapsing typhoid, and pneumonia. To determine the surface loss of heat a water calorimeter was employed, which was constructed on the same principle as the one usually employed in calorimetric work, except there was no provision for the continuous passage of a current of air. The apparatus consisted of a copper chamber,in which the limb was contained. It was two feet long and one foot wide. It was surrounded by a cylinder of zinc of corresponding form, but from three to four inches wide. The outer wall of the water chamber was protected from abstraction of heat by a thick padding of non-conducting material enclosed in a wooden case. The water was agitated by means of a special apparatus. The open end of the chamber was lined by an annular cushion of india-rubber, which, when the limb was introduced, occupied the space between its surface and that of the copper, so as to close the chamber air-tight. The leg of the patient was introduced into the apparatus, and the rubber cap covered the knee. When an observation was to be made the calorimeter was warmed to the air temperature of the room, and each experiment lasted two hours. The leg was placed on a wooden support, so as not to touch the copper, and clothed with a blanket of the same thickness as the opposite leg. He found in a healthy person the mean rise of temperature in the apparatus, and compared his fever observations with it. He arrived at the conclusion, first that the discharge of heat is increased in fever whether the temperature is constant, falls, or rises. Consequently it is certain that the production of heat is increased. In high fever the quantity of heat given off is from half as much again as the normal to twice as much. The most rapid discharge of heat takes place in the critical stage when the temperature is rapidly sinking. It may then be twice or even three times as great as normal. This rapid critical dissipation takes place with profuse sweating.

Senator believed that Leyden's observations proved two facts: 1st, that with the exception of the initial stage, the discharge of heat is considerably increased, although by no means constantly; second, that the activity of the discharge is not proportional to the bodily temperature, for it may be less when the temperature is high than when it is lower, it may be normal when the temperature is above normal, always attaining its maximum in the stage of defervescence with critical sweating. From Leyden's data he concludes the average loss of heat in fever to be seventy to seventy-five per cent., although his calorimetric observation on animals gave no definite result.

Senator's general conclusion on fever was that the discharge of heat is in the outset of fever, during the rigor, not increased but diminished; during the height of the fever it is on the whole increased seventy-five per cent, and considerably more during the critical defervesence.

Dr. Sanderson has also calculated the amount of heat in fever by using Frankland's heat value of the immediate principles of food—albumen, fat, and carbonic hydrates—when converted by oxidation into urea and carbonic acid. He arrives at the conclusion that less heat is produced in fever than when the man is fed up to food-limit, but very much more heat is produced in the febrile state than when the man is kept without food. It must be remembered that Liebermeister and Leyden believe H. P. in fever is increased even beyond that of the food limit, an increase absolute.

Dr. Carl Rosenthal has recently investigated fever by means of a calorimeter somewhat similar to that used by Prof. Leyden, except the constricting band of rubber is wisely omitted. He used the arm instead of the leg. He arrives at the conclusion that the elevation of temperature in fever is mainly due to a diminution of the H. D. There takes place simultaneously a heaping up of heat produced in the normal manner through the diminution of the H. D. It is absolutely unnecessary to have an accompanying increase of H. P. The diminution of H. D. happens in the following way. The fever agent circulating in the blood acts specifically upon a vaso-motor centre, either by a direct excitation of the vaso-constrictors, a vaso-motor contraction and diminution of H. D., or the vaso-dilators have their activity reduced, by which the vaso-constrictors obtain control and thus in an indirect manner diminish H. D. Whilst he believes diminished H. D. to be the prinpal and, in the first place, the cause of the fever, he holds it secondarily to be perhaps due to an increased production, whose origin is to be sought in an increased chemical metamorphosis which is expressed by increased discharge of urea, and is caused perhaps by changes in the blood itself by the abnormal elevation of its temperature. These experiments upon an extremity are not as satisfactory as they might be. The better plan is to do as Langlois did, put the fevered child in a calorimeter completely surrounding it, and then study H. P. and H. D. of the whole body. This is the more easy, as d'Arsonval and I have constructed a calorimeter for observations upon the whole body of a man. In a hundred and eleven observations, mainly on fever of broncho-pneumonia of children, with some on varicella, Langlois found the H. P. to be increased corresponding with the rise of temperature, but the radiation of heat is not always in constant relation with the temperature. In chronic maladies with hyperthermia, there was a diminution of the H. P., whilst in acute disease the augmentation was ten to fifteen per cent. of H. P.

If now we take the experimental data and the majority of the clinical conclusions, the result must be arrived at that fever is usually temporarily accompanied by an increased production of heat, an increase beyond that normally seen in a fasting state, but not equal to the amount produced upon a full diet. Fever cannot be due to retention of heat in my experiments, as injections of putrid blood do not elevate the arterial tension but lower it, which would cause greater dissipation. It is probable that in man during the chill the heat dissipation is temporarily lessened, and co-operates with the increased production to elevate the temperature. I wish to state here that the temperature of fever has no relation to the increased production of heat. The temperature is decided by the relation between H. P. and H. D.; they may be high or low in amount, as my curves show. All calorimetric experiments upon pyæmic fever show that H. D. is not usually decreased but increased at the time fever is generated. The researches upon albumose, peptone and neurin fever, although not accurate, support these views. In peptone fever there is a temporary fall of H. P., but the temperature rises as it does in albumose fever, but in albumose fever the H. P. does not fall but rises immediately. It is thus possible to partly differentiate an albumose from a peptone, the peptone producing a temporary decrease of H. P. before it rises, whilst an albumose causes an immediate rise of H. P. There is no reason to believe that the physical and chemical processes of fever differ from those normally going on. The thermotaxic centres at the base of the brain neither inhibit nor excite H. P.; all they do is to maintain the balance between H. P. and H. D., so as to keep the temperature at 98.4° F. The two cortical thermotaxic centres also assist. Now, in fever, these thermotaxic centres are so disordered that it is mainly the basal thermotaxic which are affected that the relation between H. P. and H. D. is so disturbed that a higher temperature results and continues. This is the part affected in fever. Neither increased production, diminished dissipation or even high temperature are necessary to constitute a fever, but it is only a disease of thermotaxic centres and mainly the four basal thermotaxic. A similar theory has been put forth by Liebermeister, but he did not prove it, nor did he understand the mechanism or the location of these basal thermotaxic centres in the production of the temperature part of fever.

My experimental researches lead me to believe that fever is due to an agent from within or without which deranges the harmony of the thermotaxic, thermogenetic and thermolytic apparatuses, by which in the initial stage the metabolism of the tissues is usually temporarily increased and this increment is usually greater than that generated upon a restricted amount of nutriment. It is highly probable that during the chill heat dissipation is temporarily diminished, but it usually follows the fluctuations of heat production. The four basal thermotaxic centres play the most important part in the temperature-phenomena of fever. That neither increased production nor diminished dissipation are necessary to constitute fever is shown in Fig. 2, where heat production is diminished, although the temperature is elevated, and in Exp. 4, at one period the temperature is subnormal, yet the heat production is greatly increased above that seen on a similar period of the preceding day.

High temperature does not cause gravity in fever, for in nervous disorders and in relapsing fever we have high temperatures, 106° F., and no serious symptoms are present. High temperature is an indication of danger in specific fever, not the cause of it. But temperature is only a part of a specific fever, there are many other morbid processes going on, the essence of which has not been grasped. Sir William Jenna puts the facts tersely when he states: "There can be no doubt that the necessity for a healthy condition of the blood is as essential to the formation of normal secretions as a healthy state of the nervous system. But while we think there is strong evidence in favor of the primary affection of the blood and of the wide-spread and fearfully severe influence on the system generally of the very deep lesion which in many cases we can demonstrate the blood to have experienced independently of mere admixture of excess of excrementitious matters, we by no means exclude the nervous system or any other part of the body from a share in the production of the symptoms of fever."

It has been observed (very rarely I think) that in meningitis, peritonitis, and certain cases of typhoid fever, that the temperature is normal or subnormal. I have shown that in the cortex of lower animals are localized thermotaxic centres, the cruciate and Sylvian, whose function it is to act in harmony with the basal thermotaxic centres to regulate the temperature of the body. In a recent paper I have also shown that in man there are very good reasons to believe in the localization of cortical thermotaxic centres. Now in meningitis the inflammation of the membranes by contiguity may so disorder the thermotaxic centres of the cortex that the temperature may become subnormal, instead of being above normal by an alteration of the harmony between the heat production and heat dissipation. In lower animals it is well known that peritoneal irritation as well as in man greatly reduces the force and frequency of the heart by reflexly stimulating the carotid-inhibitory apparatus and thus keep metabolism at a low point in the primary stage of a peritonitis. In the subnormal cases of temperature of typhoid patients it is easy to see that the disorder of the thermotaxic centres may be such that the relation of H. P. to H. D. is so arranged that the temperature becomes subnormal. An antipyretic usually temporarily produces this state of affairs in normal state. That acute observer, Dr. W. Hale White, has propounded a theory that the cause of fever in certain cases acts upon the nervous centres not directly, but indirectly through the nerves. He states that the rise of temperature noted in fever which is symptomatic of local inflammation bears no relation to the extent of the inflammatory disturbance and that the tension of the neighboring tissues plays a more important part in the production of fever than does the amount of inflammation. It is certainly the case, he states, that in abscess the temperature as a rule is highest where there is pain, and pain in abscess means tension. Dr. White believes that the "calorific centres" of the brain are affected reflexely by the tension of the inflamed parts acting as a stimulant which takes off their normal inhibition. It has not been my experience that irritation of a sensory nerve will elevate the temperature for any length of time, except in cases of poisoning by atropin, where irritation causes a rise. I shall elaborate the mechanism of the thermotaxic centres in another paper on thermo-polypnœa.

Appended are the experiments upon which the preceding statements are based.

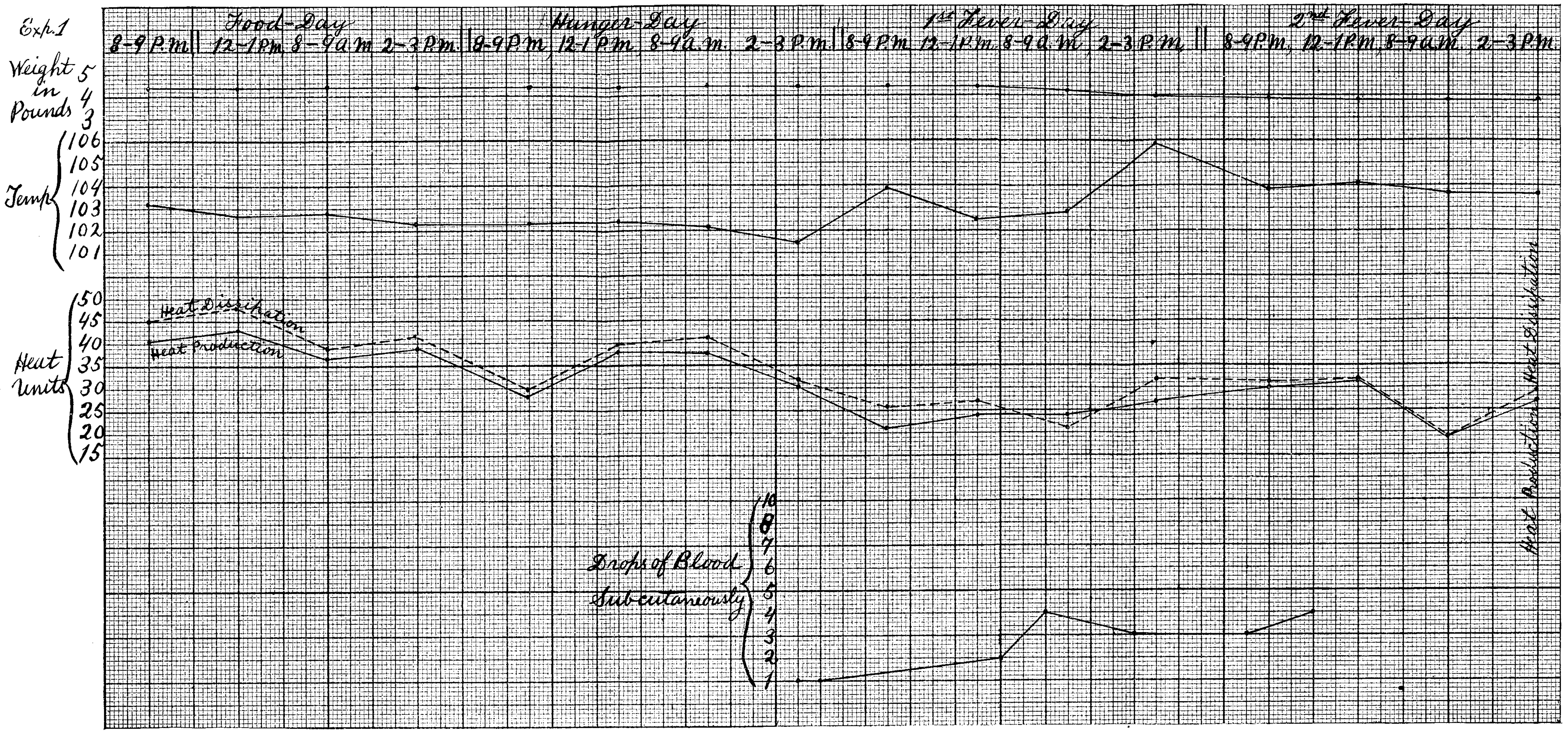
In these experiments the first day without food is called the "food day;" the second day, the "hunger day."

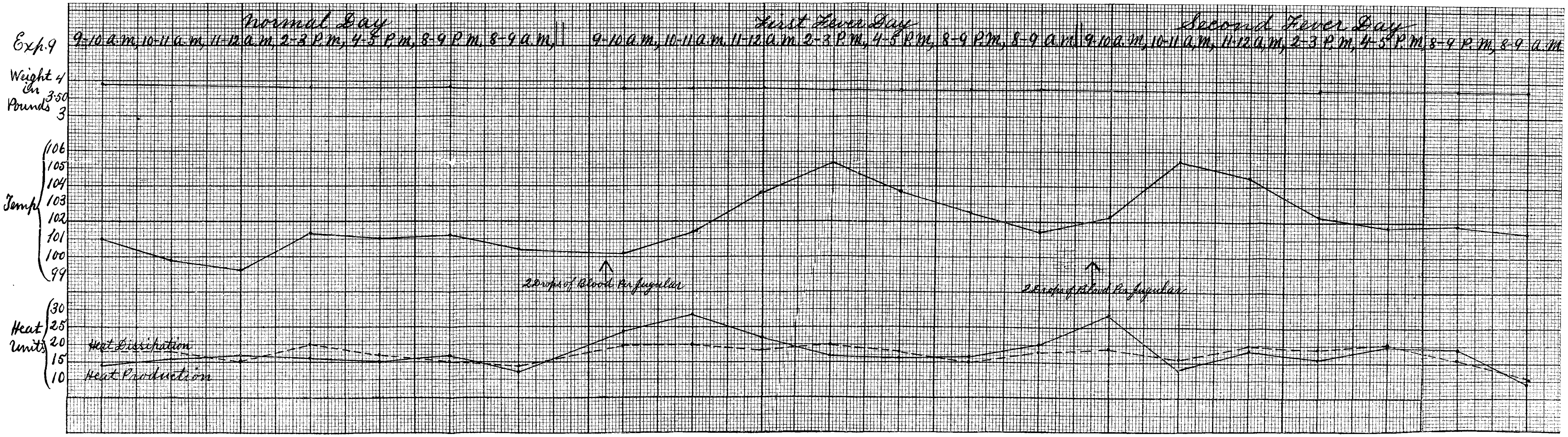
A. T. means air temperature.
C. T. " calorimeter temperature.
E. T. " exit tube "
R. T. " rectal "
H. D. " heat dissipation.
H. P. " heat production.
Weight " weight in pounds.
Litres " litres of air.

EXP. 1.—Cat.

Food Day.

P. M.	A. T.	C. T.	E. T.	R. T.	Weight 4.42
8.00	74.9	72.4	24.1	103.2	
9.00	74.3	73.5	24.	101.6	
		+ 1.1		— .6	
	H. P. =	40.02	H. D. =	45.89	
A. M.					Weight 4.40
12.30	75.0	73.4	23.9	102.9	
1.30	75.1	74.55	25.7	101.0	
		+ 1.15		— 1.9	
	H. P. =	39.58	H. D. =	47.97	
A. M.					Weight 4.34
8.20	73.3	72.95	24.3	102.9	
9.20	73.8	73.9	24.4	102.0	
		+ .95		— .9	
	H. P. =	36.39	H. D. =	39.63	


Exp. 1
Food-Day
Hunger-Day
1st Fever-Day
2nd Fever-Day
8-9 P.M. || 12-1 P.M. 8-9 a.m. 2-3 P.M. || 8-9 P.M. 12-1 P.M. 8-9 a.m. 2-3 P.M. || 8-9 P.M. 12-1 P.M. 8-9 a.m. 2-3 P.M. || 8-9 P.M. 12-1 P.M. 8-9 a.m. 2-3 P.M.
Weight in Pounds
5
4
3
Temp
106
105
104
103
102
101
Heat Units
50
45
40
35
30
25
20
15
Heat Dissipation
Heat Production
Drops of Blood Subcutaneously
10
8
7
6
5
4
3
2
1
Heat Production
Heat Dissipation


Exp. 9
Normal Day
First Fever Day
Second Fever Day
9-10 a.m., 10-11 a.m., 11-12 a.m., 2-3 P.M., 4-5 P.M., 8-9 P.M., 8-9 a.m. || 9-10 a.m., 10-11 a.m., 11-12 a.m., 2-3 P.M., 4-5 P.M., 8-9 P.M., 8-9 a.m. || 9-10 a.m., 10-11 a.m., 11-12 a.m., 2-3 P.M., 4-5 P.M., 8-9 P.M., 8-9 a.m.
Weight in Pounds
4
3.50
3
Temp
106
105
104
103
102
101
100
99
2 Drops of Blood Per Jugular
2 Drops of Blood Per Jugular
Heat Units
30
25
20
15
10
Heat Dissipation
Heat Production

P. M.					Weight 4.34
2.00	75.0	73.6	23.9	102.2	
3.00	74.6	74.6	24.5	101.3	
		+ 1.		— 1.	

H. P. = 38.12 H. D. = 41.72

Hunger Day.

P. M.	A. T.	C. T.	E. T.	R. T.	Weight 4.34
8.10	75.8	74.7	25.0	102.4	
9.10	75.4	75.4	24.5	102.2	
		+ .7		— .2	

H. P. = 28.49 H. D. = 29.20

A. M.					Weight 4.28
12.30	76.1	75.55	26.3	102.4	
1.30	78.1	76.50	26.2	102.0	
		+ .95		— .4	

H. P. = 38.21 H. D. = 49.63

A. M.					Weight 4.12
8.15	76.4	74.95	26.0	102.0	
9.15	77.5	75.95	25.9	101.4	
		+ 1.00		— .6	

H. P. = 39.67 H. D. = 41.72

P. M.					Weight 4.12
1.45	79.3	76.0	26.5	101.5	
2.45	78.7	76.75	26.2	101.4	
		.75		— .4	

H. P. = 30.95 H. D. = 31.29

P. M.		
3.00	1 gtt. of blood several months old, subcutaneously.	
4.00		102.8
5.15		103.1

First Fever Day.

P. M.	A. T.	C. T.	E. T.	R. T.	
7.55	80.6	78.1	26 7	103.9	
8.55	79.3	78.75	26.6	102.3	
		+ .65		— 1.6	

H. P. = 21.27 H. D = 27.11

A. M.					Weight 4.2
12.42	78.7	78.65	25.8	102.5	
1.42	79 5	79.3	27.0	101.8	
				.7	

H. P. = 24.77 H. D. = 27.11

A. M.
1.43 2 gtts. of blood several months old, subcutaneously.
6 3 " " " " " "
8 3 " " " " " "
8.39 1 " " " " " "

8.40	75.6	75.65	25.6	103.8
9.40	76.2	76.2	25.9	104.3
				.5

H. P. = 24.60 H. D. = 22.94

10.00 3 gtts. of blood several months old, subcutaneously.
11.20 104.4
P. M.
1.20 3 gtts. of blood several months old, subcutaneously.
Weight 3.98

2.05	78.7	76.1	26.4	105.8
3.05	79.5	76.9	26.7	104.2
				16.

H. P. = 27.60 H. D. = 33.37

Second Fever Duy.

P. M.
8.14 3 gtts. of blood several months old, subcutaneously.
Weight 3.98

	A. T.	C. T.	E. T.	R. T.
8.15	81.3	77.95	27.2	103.9
9.15	78.7	78.7	26.3	103.65
		+.75		—.25

H. P. = 30.46 H. D. = 31.28

A. M.
12.45 4 gtts. of blood several months old, subcutaneously.
Weight 3.96

12.47	78.6	78.6	27.2	104.0
1.47	80.3	79.5	28.2	104.1
		+.9		.1

H. P. = 37.87 H. D. = 37.54

8.04 10 gtts. of blood several months old, subcutaneously.
Weight 3.88

8.05	77.1	77.0	25.4	103.6
9.05	76.4	77.5	25.5	103.6
		+.5		

H. P. = 20.86 H. D = 20.86

11.50				104.0	
P. M.					
1.54	10 gtts. of blood several months old, subcutaneously.				
1.55	77.8	77.1	26.	103.6	
2.55	78.8	77.8	26.6	103.5	
		+ .7		— .1	
	H. P.	= 28.88	H. D.	= 29.20	
3 15	1 gtt. of blood several months old, per jugular.				
3.20	79.1	77.9	26.7	104.2	
4.20	80.1	78.45	27.6	105.3	
		.55			
	H. P.	= 26.48	H. D.	= 22.94	

EXP. 2.—Rabbit.

Food Day.

A. M.	A. T.	C. T.	E T.	R. T.	Weight 5.16
8.10	69.7	68.85	22.5	102.4	
9.10	71.1	69.9	22.5	101.5	
		+ 1.05		— .9	
	H. P.	= 40.05	H. D.	= 43.80	
P. M.					Weight 5.16
1.45	71.6	69.8	22.5	102.0	
2.45	91.8	70.95	22.1	101.4	
		+ 1.15		— .6	
	H. P.	= 45.41	H. D.	= 47.97	
					Weight 5.1
7.35	71.9	71.1	22.2	102.9	
8.35	73.5	72.05	22.6	102.4	
		+ .95		— .5	
	H. P.	= 37.52	H. D.	= 39.63	
A. M.					Weight 4.96
12.42	72.5	72.2	22.2	102.4	
1.42	75.3	73.2	22.6	102.7	
		+ 1.0		+ .3	
	H. P.	= 42.72	H. D.	= 41.72	

Hunger Day.

A. M.	A. T.	C. T.	E. T.	R. T.	Weight 4.94
8.35	72.8	72.3	27.5	102.3	
9.35	74.6	73.2	27.4	102.4	
		+ .9		+ .1	
	H. P.	= 37.95	H. D.	= 37.54	

P. M.					Weight 4.80
1.45	76.4	73.35		102.2	
2.45	77.0	74.2		102.4	
		.85		+ .2	
	H. P. =	36.72	H. D. =	35.46	
					Weight 4.80
8.02	78.3	75.55		102.7	
9.02	78.0	76.55		102.8	
		+1.00		+ .1	
	H. P. =	40.02	H. D. =	39.63	
A. M.					Weight 4.74
1.58	78.	76.75		102.3	
2.58	78.1	77.49		102.8	
		+ . 74		+ .5	
	H. P. =	32.84	H. D. =	30.87	

3.7 1 gtt. of blood several months old, subcutaneously.

First Fever Day.

A. M.					Weight 4.68
8.14	1 gtt. of blood several months old, subcutaneously.				
8.15	77.1	76.85		103.4	
9.15	77.9	77.8		103.7	
		.95		+ .3	
	H. P. =	40.83	H. D. =	39.63	
P. M.					Weight 4.6
1.32	1 gtt. of blood several months old, subcutaneously.				
1.33	80.1	77.95		103.9	
	79.7	78.85		103.7	
		.90		— .2	
	H. P. =	36.78	H. D. =	37.54	
7.48	3 gtts. of blood several months old, subcutaneously.				
7.50	81.0	79.5		103.8	
	78.3	80.3		103.9	
		+ .8		+ .1	
	H. P. =	33.74	H. D. =	33.37	
A. M.					
12.30	5 gtts. of blood several months old, subcutaneously.				
12.31	80.4	80.3		105.1	
1.31	81.5	81.2		104.4	
		+ .9		+ 1.3	
	H. P. =	42.53	H. D. =	37.54	

Second Fever Day.

A. M.				Weight 4.40
8.6	5 gtts. of blood, subcutaneously.			
8.7	79.6	79.6	103.6	
9.7	82.2	80.35	103.8	
		.75	+ .2	
	H. P. =	32.02	H. D. = 31.29	
1.56	12 gtts. of blood, subcutaneously.			
P. M.				Weight 4.30
1.58	83.1	80.10	103.6	
2.58	81.1	80.9	103.8	
		+ .8	+ .2	
	H. P. =	34.08	H. D. = 33.37	
8.0	10 gtts. of blood injected into the peritoneal cavity.			
8.5	80.1	80.2	103.8	
9.5	81.6	81.0	105.2	
		+ .8	+ 1.4	
	H. P. =	38.29	H. D. = 33.37	
A. M.				
1.	15 gtts. of blood into peritoneal cavity.			Weight 4.14
1.2	81.3	81.0	103.6	
2.2	82.8	81.8	103.1	
		+ .8	—. 5	
	H. P. =	31.66	H. D. = 33.37	

EXP. 3.—Dark-colored rabbit.

Food Day.

P. M.	A. T.	C. T.	E. T.	R. T.	
12.35	74.6	74.3	24.6	102.3	Weight 3.74 Litres of air drawn through calorimeter
1.35	75.1	75.1	24.0	101.9	124.25
	H. P. =	31.51	H. D. =	33.37	
					Weight 3.72
8.07	74.1	73.85	24.4	102.4	Litres of air 126.62
9.07	75.4	74.5	24.6	101.8	
		+ .4		— .6	
	H. P. =	25.27	H. D. =	27.12	

A. M.					Weight 3.66
2.00	75.9	75.15	24.7	102.1	Litres 111.50
3.00	77.3	75.9	25.0	101.2	
	H. P. =	31.59	H. D. =	31.29	
					Weight 3.56
7.55	77.8	76.1	26.3	102.8	Litres 123.67
8.55	78.3	76.8	26.0	101.5	
				— 1.3	
	H. P. =	25.36	H. D. =	29.20	

Hunger Day.

P. M.					Weight 3.54
12.37	77.3	77.3	25.9	102.1	Liters 118.37
1.37	78.1	77.8	26.2	101.8	
		+ .5		— .3	
	H. P. =	19.98	H. D. =	20.86	
					Weight 3.5
8.17	72.0	71.7	23.6	101.8	
9.17	73.2	72.35	22.8	100.7	Litres 116.11
		+ .65		— 1.1	
	H. P. =	23.92	H. D. =	27.11	
A. M.					Weight 3.44
1.45	73.3	72.4	24.3	101.5	Litres 113.75
2.45	74.3	73.0	24.2	101.2	
		+ .6		— .3	
	H. P. =	24.17	H. D. =	25.03	
					Weight 3.36
7.55	74.0	73.1	24.6	101.5	Litres 106.12
8.55	75.6	73.8	24.3	100.7	
		+ .7		— .8	

9.00 1 gtt. of blood several months old, subcutaneously.

First Fever Day.

P. M.					Weight 3.32
12.35	1 gtt. of old blood, subcutaneously.				
12.36	74.2	74.18	24.1	101.0	Litres 106.05
1.36	75.7	74.80	25.1	100.8	
		+ .62		— .2	
	H. P. =	25.31	H. D. =	25.86	

					Weight 3.24
8.00	5 gtt. of blood, subcutaneously.				
8.20	67.6	68.7	21.4	100.9	Litres 47.57
9.20	70 0	69.2	21.4	99.6	
		+ .5		— 1.3	
	H. P. =	17.31	H. D. =	20.86	
9.30	5 gtt. of blood 13 days old, subcutaneously.				
11.20	5 gtt. of blood 13 days old, into peritoneal cavity.				
12 M.				99.6	
A. M.					Weight 3.18
1.45	5 gtt. of blood 13 days old, subcutaneously.				
1.50	72.1	69.4	23.0	95.6	Litres 211.00
2.50	74.1	69.98	22.9	94.8	
		+ .58		— .8	
	H. P. =	22.08	H. D. =	24.19	
					Weight 3.14
7.45	71.5	70.6	22.5	90.6	Litres 113.35
8.45	71.2	71.2	22.4	88.2	
		+ .6		— 2.4	
	H. P. =	18.78	H. D. =	25.03	
9.30	Animal dead.				

EXP. 4.—White rabbit.

Food Day.

P. M.	A. T.	C. T.	E. T.	R. T.	Weight 3.58
1.44	75.1	75.1	24.0	100.9	Litres 115.37
2.44	76.8	75.7	24.9	101.7	
		+ .6		+ .8	
	H. P. =	27.40	H. D. =	25.03	
					Weight 3.5
9.20	77.0	74.55	24.8	101.3	Litres 119.87
10.20	76.2	75.15	24.7	100.9	
				— 4	
	H. P. =	23.87	H. D. =	25.03	
A. M.					Weight 3.52
3.00	77.3	75.9	25.0	101.0	Litres 129.70
4.00	77.3	76.35	25.3	101.1	
		+ .45		+ .1	
	H. P. =	19.06	H. D. =	18.77	

					Weight 3.50
8.55	78.3	76.8	26.0	101.8	Litres 119.82
9.55	78.5	77.35	26.3	102.0	

H. P. = 23.52 H. D. = 22.94

Hunger Day.

P. M.					Weight 3.42
1.37	78.1	77.8	26.2	102.1	Litres 118.44
2.37	82.8	78.35	28.2	102.2	
		+ .55		+ .1	

H. P. = 23.22 H. D. = 22.94

					Weight 3.34
9.17	73.2	72.35	22.8	101.4	Litres 113.55
10.17	73.0	72.8	22.8	101.0	
		+ .45		— .4	

H. P. = 17.66 H. D. = 18.77

A. M.					Weight 3.28
2.45	74.3	73.0	24.2	101.4	Litres 102.41
3.45	74.8	73.6	24.0	100.3	
		+ .6		— 1.1	

H. P. = 22.03 H. D. = 25.03

					Weight 3.28
8.55	75.6	73.8	24.3	100.8	Litres 97.38
9.55	75.5	74.3	24.3	100.7	

H. P. = 20.59 H. D. = 20.86

10.05 1 gtt. of blood several months old, hypodermically.
1.32 2 gtt. " " " "

First Fever Day.

P. M.					Weight 3.22
1.37	75.7	74.8	25.1	102.3	Litres 169.12
2.37	78.9	75.35	26.1	102.3	
		.55		— .0	

H. P. = 22.94 H. D. = 22.94

Weight 3.14

9.15 5 gtt. of blood several months old, subcutaneously.

9.20	70.0	69.2	21.4	100.2	Litres 94.47
10 20	71.7	69.7	21.9	100.7	

H. P. = 22.16 H. D. = 20.86

A. M.					Weight 3.10
2.45	5 gtt. of blood 13 days old, subcutaneously.				
2.50	74.1	69.98	22.9	101.3	Litres 106.75
3.50	72.5	70.60	22.2	100.2	
		+ .62		+ 1.1	
	H. P. = 23.02		H. D. = 25.86		

					Weight 3.10
8.44	10 gtt. of blood, 13 days old.				
8.45	71.7	71.2	22.4	102.1	Litres 103.82
9.45	74.0	71.8	23.7	100.2	
		+ .6		— 1.9	
	H. P. = 20.14		H. D. = 25.86		

Second Fever Day.

P. M.					
1.35	5 gtt. of blood 13 days old, subcutaneously.				
1.37	71.7	71.65	23.2	101.7	Litres 103.70
2.37	73.0	72.20	22.8	100.3	
		.55		— 1.4	
	H. P. = 19.34		H. D. = 22.94		

A. M.					Weight 3.00
8.00	1 gtt. of blood 13 days old, per jugular.				
9.10	69.5	69.7	21.8	99.1	Litres 73.02
10.10	72.2	70.05	22.7	100.4	
		+ .35		+ 1.3	
	H. P. = 17.83		H. D. = 14.60		

2.35	5 gtt. of blood 13 days old, subcutaneously.				
2.40	71.3	69.7	22.5	98.4	Litres 62.62
3.40	73.2	70.25	22.6	97.5	
		+ .55		— .9	
	H. P. = 20.75		H. D. = 22.94		

8.50	73.1	71.0	22.8	97.1	Litres 105.75
9.50	74.3	71.6	23.2	97.2	
		+ .6		+ .1	
	H. P. = 25.27		H. D. = 25.03		

EXP. 5.—Fawn-colored rabbit.

Food Day.

A. M.	A. T.	C. T.	E. T.	R. T.	Weight 3.5
8.10	67.4	67.3	21.1	101.9	Litres 55.52
9.10	69.8	68.05	21.1	101.8	

H. P. = 31.00 H. D. = 31.29. Weight 3.46

P. M.					Litres 33.32
1.45	73.1	68.95	22.6	102.5	
2.45	74.9	69.85	24.3	101.8	
		.9		— .7	

H. P. = 35.53 H. D. = 37.54

P. M.					Weight 3.34
8.15	76.6	72.55	2.40	102.1	Litres 73.85
9.15	76.1	73.25	2.40	101.8	
		+ .7		— .3	

H. P. = 28.37 H. D. = 29.20

A. M.					Weight 3.34
12.45	73.7	74.0	23.6	102.1	Litres 120.
1.45	77.	74.65	24.7	102.1	
		+ .65		.0	

H. P. = 27.11 H. D. = 27.11

Hunger Day.

A. M.					Weight 3.3
8.15	73.3	74.25	24.1	101.7	Litres 105.0
9.15	75.9	74.7	24.5	101.7	
		+ .45		.0	

H. P. = 18.77 H. D. = 18.77

P. M.					Weight 3.3
1.45	77.2	75.3	25.6	101.4	Litres 115.0
2.45	78.0	75.8	25.5	102.0	
		+ .5		+. 6	

H. P. = 22.50 H. D. = 20.86

					Weight 3.28
7.55	78.2	76.3	26.3	101.9	Litres 117.5
8.55	78.6	76.85	26.0	102.0	
		+ .55		+ .1	

H. P. = 23.21 H. D. = 22.94

A. M.					Weight 3.28
12.40	77.6	77.45	26.7	102.0	Litres 115.0
1.40	79.7	78.0	25.7	101.8	
		+ .55		— 2.	

H. P. = 22.4 H. D. = 22.94

2.55 1 gtt. of blood six days old, subcutaneously.
7.00 3 gtts. " " " " "

First Fever Day.

A. M.					Weight 3.08
8.20	73.5	73.4	24.3	102.0	Litres 100.0
9.20	75.3	73.8	24.4	102.3	
		+ .4			

H. P. = 17.44 H. D. = 16.68

8.30 3 gtts. of blood six days old, subcutaneously.
12.00 5 gtts. " " " " "

P. M.					Weight 3.0
1.50	76.	74.4	25.2	103.6	Litres 72.5
2.50	76.9	75.0	24.9	103.6	
		+ .6		.0	

H. P. = 25.03 H. D = 25.03

5.30 7 gtts. of blood six days old, hypodermically.
6.30 Lying on side, rolling from side to side, clonic and tonic convulsions, opisthotomos, trismus, death.

EXP. 6.—White rabbit.

Food Day.

A. M.	A. T.	C. T.	E. T.	R. T.	Weight 2.9
9.10	69.8	68.05	21.1	101.1	
10.10	69.9	68.7	21.1	101.6	Litres 140.30
		+ .65		.5	

H. P. = 28.31 H. D. = 27.11

P. M.					Weight 2.82
2.40	Animal aborted.				
2.45	74.9	69.85	24.3	101.4	Litres 93.10
3.45	77.	70.6	24.1	101.8	
		+ .75		+ .4	

H. P. = 30.36 H. D. = 31.29

9.15	76.1	73.25	24.	101.5	Weight 2.76
10.15	76.6	73.9	24.8	101.6	Litres 106.35
		+.65		+.1	
	H. P. =	27.34	H. D. =	27.11	
A. M.					Weight 2.72
1.45	77.	74.65	24.7	101.5	Litres 125.00
2.45	75.7	75.3	24.7	101.7	
		+.65		+.2	
	H. P. =	27.51	H. D. =	27.11	

Hunger Day.

A. M.					Weight 2.66
9.15	75.9	74.7	24.5	101.5	Litres 120.00
10.15	78.2	75.3	25.8	101.5	
		+.6		.0	
	H. P. =	25.03	H. D. =	25.03	
P. M.					Weight 2.66
2.45	78.0	75.8	25.5	102.0	Litres 110.00
3.45	79.5	76.45	26.3	102.0	
		+.65		.0	
	H. P. =	27.11	H. D. =	27.11	
8.55	78.6	76.85	26.0	101.6	Weight 2.60
9.55	77.9	77.3	25.9	101.7	Litres 100.00
		+.45		+.1	
	H. P. =	18.98	H. D. =	18.77	
A. M.					Weight 2.52
1.45	79.7	78.	25.7	101.7	Litres 110.00
2.45	79.1	78.4	25.7	102.1	
		.4		+.4	
	H. P. =	17.51	H. D. =	16.68	

A. M.
2.55 1 gtt. of blood six days old, hypodermically.
7.05 3 gtt. " " " " "

First Fever Day.

A. M.					Weight 2.5
9.20	75.3	73.8	24.4	102.9	Litres 97.50
10.20	76.6	74.35	24.8	103.6	
		+.55		+.3	
	H. P. =	24.39	H. D. =	22.94	

12.30 5 gtt. of blood 6 days old, subcutaneously.

P. M.					Weight 2.4
3.0	76.9	75.05	25.3	103.6	Litres 100.0
4.0	77.4	75.55	25.3	104.1	
		+.5		+.5	
		H. P. = 21.85		H. D. = 20.86	

6.30 5 gtt. of blood 6 days old, subcutaneously.

Weight 2.34

9.15 Animal died, considerable diarrhœa preceding.

EXP. 7.—White Rabbit.

Hunger Day.

A. M.	A. T.	C. T.	E. T.	R. T.	
					Weight 4.94
8.55	76.3	73.3	25.2	100.2	Litres 75.00
9.55	75.0	74.1	24.2	100.3	
		+.8		+.1	
		H. P.=33.78		H. D.=33.37	
9.57	75.0	74.2	24.2	100.3	Litres 80.00
10.57	76.4	74.75	24.7	101.0	
		.55		.7	
		H. P. = 25.81		H. D. = 22.94	
11.00	76.4	74.8	24.7	101.0	Litres 60.00
12.00	78.0	75.4	25.7	100.6	
		+.6		—.4	
		H. P. = 23.40		H. D. = 25.03	
P. M.					Weight 4.92
2.00	76.7	75.45	25.2	100.6	Litres 75.00
3.00	77.1	76.1	25.2	101.0	
		+.65		+.4	
		H. P. = 28.73		H. D. = 27.11	
					Weight 4.90
4.00	77.4	76.15	25.7	100.6	Litres 75.00
5.00	78.2	76.75	26.0	101.2	
		+.6		+.6	
		H. P. = 27.47		H. D. = 25.03	

A. M.					Weight 4.88
8.05	77.0	76.8	25.4	100.9	Litres 70.00
9.05	77.9	77.4	25.9	101.0	
	H. P. =	23.94	H. D. =	27.11	

First Fever Day.

Weight 4.78

9.00 2 gtt. of blood 17 days old, per jugular.

9.24	74.9	73.9	24.2	101.5	Litres 72.50
10.24	75.4	74.5	24.6	102.3	
		.6		+ .8	
	H. P. =	28.20	H. D. =	25.03	
					Weight 4.78
10.30	75.5	74.5	24.6	102.3	Litres 65.00
11.30	76.1	75.2	25.0	101.8	
	H. P. =	26.81	H. D. =	29.20	
					Weight 4.76
11.40	76.2	75.3	25.0	101.8	Litres 70.00
12.40	77.0	75.95	25.3	101.2	
		+ .65		— .6	
	H. P. =	24.75	H. D. =	27.11	
P. M.					Weight 4.76
2.15	77.1	75.8	25.4	100.0	Litres 67.30
3.15	78.3	76.5	25.9	99.6	
		+ .7		— .4	
	H. P. =	27.63	H. D. =	29.20	
4.10	78.8	76.7	26.5	99.9	Litres 67.50
5.10	79.1	77.1	26.4	100.3	
				+ .3	
	H. P. =	17.74	H. D. =	16.68	
8.04.	Animal dying.			99.7	

EXP. 8.—Cat.

Hunger Day.

A. M.	A. T.	C. T.	E. T.	R. T.	Weight 3.32
8.45	76.8	75.25	26.2	100.6	Litres 55.0
9.45	77.2	76.0	25.6	100.0	
		+ .75		— .6	
	H. P. =	29.64	H. D. =	31.29	

9.50	77.3	76.0	25.6	100.0	Litres 52.50
10.50	78.2	76.5	26.1	99 7	
		+ .5		— .3	
	H. P. =	20.04	H. D. =	20.86	
10.55	78.2	76.5	26.1	99.7	Litres 42.50
11.55	77.2	77.0	25.8	99.8	
		+ .5		+ .1	
	H. P. =	21.13	H. D. =	20.86	
P. M.					Weight 3.28
2.05	79.3	77.5	26.8	100.6	Litres 50.00
3.05	78.5	77.55	26.1	101.8	
		+ .5		+ 1.2	
	H. P. =	24.12	H. D. =	20.86	
					Weight 3.28
4.00	79.1	77.6	26.5	101.4	Litres 57.50
5.00	78.7	78.0	26.2	101.3	
		+ .4		— .1	
	H. P. =	16.42	H. D. =	16.68	
					Weight 3.26
8.05	79.2	78.5	27.3	102.4	Litres 45.00
9.05	79.4	78.7	26.5	101.8	
		+ .65		— .6	
	H. P. =	25.50	H. D. =	27.11	
A. M.					Weight 3.24
7.52	76.4	74.4	25.7	100.8	Litres 115.00
8.52	74.1	74.9	23.9	100.7	
		+ .5		— .1	

First Fever Day.

					Weight 3.20
9.10	2 gtt. of blood 18 days old, per jugular.				
9.15	77.2	74.95	26.1	100.2	Litres 112.50
10.15	76.2	75.5	24.7	102.0	
		+ .55		+ 1.8	
	H. P. =	27.7	H. D. =	22.92	
					Weight 3.2
10.20	76.5	75.55	25.1	101.8	Litres 112.50
11.20	76.4	76.0	25.5	102.4	
		.45		+ .6	
	H. P. =	20.36	H. D. =	18.77	

11.25	76.4	76.0	25.5	102.6	Litres 92.40
12.25	79.1	76.45	26.1	103.5	
		+.45		+.9	
	H. P. =	21.14	H. D.	18.77	
P. M.					Weight 3.18
2.00	82.4	76.8	28.0	104.3	Litres 77.50
3.00	83.5	77.6	28.7	102.1	
		+.8		— 2.2	
	H. P.	27.51	H. D. =	33.37	
					Weight 3.18
4.00	85.2	77.95	29.2	102.8	Litres 30.00
5.00	84.4	78.7	29.0	102.1	
		+.75			
					Weight 3.18
8.05	84.7	79.45	28.8	103.0	Litres 72.50
9.05	83.1	80.05	27.6	101.4	
		+.6		+1.6	
	H. P. =	20.81	H. D. =	25.03	
A. M.					Weight 3.16
7.40	80.9	80.85	27.0	101.1	Litres 163.00
8.40	82.7	81.4	28.2	100.3	
		+.55		—.8	
	H. P. =	20.85	H. D. =	22.94	

Second Fever Day.

A. M.					Weight 3.16
8.45	2 gtt. of blood 19 days old, per jugular.				
9.00	83.0	81.45	28.3	100.3	Litres 147.50
10.00	82.0	81.80	27.8	103.5	
		+.45		.32	
	H. P. =	22.98	H. D. =	14.59	
					Weight 3.16
10.05	82.8	81.80	27.8	103.5	Litres 52.50
11.05	86.5	82.30	29.9	103.7	
		+.5		+.2	
	H. P. =	21.38	H. D. =	20.86	

11.10	86.5	82.3	29.9	103.7	Litres 142.50
P. M.					
12.10	84.4	82.78	28.9	102.3	
		+ .48		+ 1.4	

H. P. = 16.35 H. D. = 20.02

12.40 2 gtt. of blood 19 days old, per jugular.

					Weight 3.6
1.53	84.0	82.8	29.1	105.1	Litres 70.00
2.53	84.1	83 4	29.0	104.0	
		+ .6		+ 1.1	

H. P. = 22 05 H. D. = 25.03

4.00	84.8	83.4	29.5	102.9	Litres 75.00
5.00	85.2	84.0	29.8	101.3	
		+ .6		— 1.6	

H. P. = 20.25. H. D. = 25.03

5.05 2 gtt. of blood 19 days old, per jugular.

					Weight 3.00
8.00	88.0	84.5	31 5	103.8	Litres 82.50
9.00	84.9	84.9	28.5	102.0	
		+ .4		— 1,8	

H. D. = 16.68 H. P. = 12.20

A. M.					Weight 2.98
7.30	79.0	78.45	26.9	100.6	Litres 80.00
8.30	80.0	78.75	26.8	102.1	
		+ .30		+ .5	

H. D. = 12.51 H. P. = 11.28

EXP. 9.—Cat—tortoise-shell color.

Hunger Day.

A. M.	A. T.	C. T.	E. T.	R. T.	Weight 3.98
9 00	78.5	78.7	26.5	101.0	Litres 75.00
10.00	78.6	79.15	26.4	99.8	
		+. 45		—.2	

H. P. = 14.82 H. D. = 18.77

					Weight 3.98
10.05	78.8	79.2	26.4	99.8	Litres 65.00
11.05	80.1	79.65	26.9	99.1	
		+ .45		— .7	
	H. P. =	16.47	H. D. =	18.77	
					Weight 3.9
11.08	80.1	79.65	26.9	99.1	Litres 135.00
12.08	80.7	80.05	27.2	99.2	
		+ .4		+ .1	
	H. P. =	17.00	H. D. =	16.68	
P. M.					
2.10	79.6	80.0	27.1	101.4	Litres 145.00
3.10	81.4	80.5	27.5	100.1	
		+ .5		— .13	
	H. P. =	16.66	H. D. =	20.86	
					Weight 3.9
4.10	81.5	80.6	27.7	101.0	Litres 147.50
5.10	81.9	81.0	27.9	100.5	
		+ .4		— .5	
	H. P. =	15.06	H. D.	16.68	
					Weight 3.9
8.15	79.6	80.9	28.7	101.1	Litres 127.50
9.15	82.0	81.3	27.7	102.2	
		+ .4		+ .1	
	H. P. =	17.00	H. D. =	16.68	
A. M.					Weight 3.86
8.00	77.2	74.95	25.9	100.4	Litres 125.00
9.00	74.4	75.3	23.9	99.4	
		+ .35		— 1.0	
	H. P. =	13.29	H. D. =	14.60	

First Fever Day.

A. M.					Weight 3.86
9.10	2 gtt. of blood 21 days old, per jugular.				
9.20	76.7	75.4	26.2	100.2	Litres 127.00
10.20	76.7	75.9	25.2	101.3	
		+ .5			
	H. P. =	24.70	H. D. =	20.86	

					Weight 3.80
10.30	76.9	75.9	25.2	101.4	Litres 117.50
11.30	78.1	76.4	25.9	103.8	
	H. P. =	28.42	H. D. =	20.86	
					Weight 3.80
11.45	78.1	76.4	25.9	103.8	Litres 125.00
12.45	78.2	76.85	26.0	104.9	
		+ .45		+ 1.1	
	H. P. =	22.24	H. D. =	18.77	
P. M.					Weight 3.76
2.10	79.6	77.0	27.0	105.2	Litres 120.00
3.10	78.1	77.5	26.0	104.1	
		+ .5		— 1.1	
	H. P. =	17.44	H. D. =	20.86	
					Weight 3,74
4.10	81.1	77.75	27.7	103.9	Litres 125.00
5.10	78.7	78.2	26.4	103.6	
	H. P. =	17.75	H. D. =	18.77	
					Weight 3.74
8.15	80.1	78.4	27.0	102.6	Litres 105.00
9.15	79.0	78.8	26.1	102.7	
		+ .4		— .1	
	H. P. =	16.99	H. D. =	16.68	
A. M.					Weight 37.0
8.05	75.6	74.25	24.7	101.6	Litres 92.50
9.05	76.5	74.7	25.0	102.2	
		+ .45		+ .6	
	H. P. =	20.61	H. D. =	18.77	

Second Fever Day.

A. M.					Weight 3.7
9.12	2 gtt. of blood twenty-two days old,				per jugular.
9.15	76.3	74.7	25.	102.2	Litres 100.00
10.15	76.8	75.15	25.2	105.4	
		+ .45		+ 3.2	
	H. P. =	28.59	H. D. =	18.77	
10.20	76.9	75.2	25.2	105.4	Litres 85.00
11.20	76.3	75.6	24.9	104.4	
		+ .4		+ 1.0	
	H. P. =	13.61	H. D. =	16.68	

11.23	76.8	75.7	25.	104.4	Litres 75.00
12.23	77.8	76.1	25.7	103.8	
		+ .5		—. 6	
	H. P. =	19.02	H. D. =	20.80	
P. M.					Weight 3.64
2.10	78.	76.15	25.9	102.3	Litres 137.00
3.10	77.6	76.6	25.4	101.7	
		+ .45		— 6	
	H. P. =	16.97	H. D. =	18.77	
4.20	78.6	76.65	26.	101.8	Litres 110.20
5.20	79.0	77.15	26.	101.7	
		+ .50		— .1	
	H. P. =	20.56	H. D. =	20.86	
8.10	77.8	77.2	25.7	101.9	Weight 3.58
9.10	78.3	77.6	25.9	102.7	Litres 120.00
		+ .4		+ .8	
	H. P. =	19.05	H. D. =	16.68	
A. M.					Weight 3.56
8.00	75.	74.85	22.6	101.1	
9.00	78.	75.1	24.6	100.7	
		+ .25		— .4	
	H. D. =	9.23	H. P. =	10.43	

EXP. 10.—Cat.

Hunger Day.

A. M.					Weight 5.6
10.10	74.4	74.4	22.	101.1	Litres 77.50
11.10	78.	75.15	26.1	100.4	
		.75		— .7	
	H. P. =	28.84	H. D. =	31.29	

11.20 2 gtt. of blood seven days old, per jugular.

11.20	78.	75.2	25.6	100.4	Litres 105.00
12.20	78.	76.0	25.8	102.3	
		+ .8		+ .9	
	H. P. =	37.55	H. D. =	33.37	

12.24	78.	76.	25.8	102.3	Litres 92.50
1.24	79.5	76.75	26.8	102.5	
		+ .75		+ .2	
	H. P. =	32.21	H. D. =	31.29	
1.32	79.5	76.8	26.3	102.5	Weight 5.48
2.32	79.1	77.3	26.3	104.4	Litres 70.00
		+ .5		+ 1.9	
	H. P. =	29.50	H. D. =	20.86	
2.40	79.5	77.4	26.3	104.4	Weight 5.48
3.40	79.5	78.1	26.6	104.8	Litres 105.00
		+ .7		+ .4	
	H. P. =	31.01	H. D. =	29.20	
3.45	79.5	77.1	26.6	104.8	Litres 90.00
4.45	79.8	78.8	26.8	104.0	
		+ .7		— .8	
	H. P. =	25.56	H. D. =	29.20	

Observation arrested.

The preceding experiments have been tabulated below, that they may be more readily understood and compared.

EXP. 1.

	P.M. 8–9	A.M. 12.30–1.30	8.20–9.20	P.M. 2–3	Average Temp.	Hourly H. P.	Excess or deficit of H. P. on fever days.
H. P.	103.2	102.9	102.9	102.2	= 102.8		
	40	47	36	38			
	102.4	102.4	102.0	101.5	= 102.0		
	28	38	39	30		= 33.75	During 8–9 period, 2d fever day an excess of 2 units.
	103.9	102.5	103.8	105.8	= 104.0 =		
	121	24	24	27		= 26.00	— 7.75
	103.9	104.0	103.6	103.6	= 103.7 =		
	30	37	20	28		= 28.75	— 5.00
						Hourly H. D.	Excess or deficit of H. D. on fever days.
H. D.	45	47	39	41		= 43	
	29	39	41	31		= 35	
	27	27	22	33		= 27	— 8.0 During 8–9 period, an increase of 2 units.
	31	37	20	29		= 29	— 6.0

EXP. 2.

	A.M. 8.10– 9.10	P.M. 1.45– 2.45	7.35– 8.35	A.M. 12.42– 1.42		Hourly H. P.	Excess or deficit of H. P. on fever days.
H. P.	102.4	102.0	102.9	102.4			
	40	45	37	42			
	102.3	102.2	102 7	102.8	=	102 3	
	37	36	40	32	=	36.2	
	103.4	103.9	103.8	104.1	=	103.8	
	40	36	33	42	=	37.7	+ 1.5
	103.6	103.6	103.8	103.6	=	103.6	
	32	34	38	31	=	33.7	— 2.5

						Hourly H D.	Excess or deficit of H. D. on fever days.
H. D.	43	47	39	41			
	37	35	39	30	=	35.2	
	39	37	33	37	=	36.5	+ 1.3
	31	33	33	33	=	32.5	— 2.7

EXP. 3.

	P. M. 12.35– 1.35	8.07– 9.07	2–3	7.55– 8.55		Hourly H. P.	Excess or deficit of H. P. on fever days.
H. P.	102.3	102.4	102.1	102.8	=	102.4	
	31	25	31	25	=	28 2	
	102.1	101.8	101.5	101.5	=	101.7	
	23	24	24	26	=	24.2	— 4.0
	101.0	100.9	96.8	90.6	=	97.5	
	25	17	22	18	=	20.5	— 8.2

						Hourly H. D.	Excess or deficit of H. P. on fever days.
H. D.	33	27	31	29	=	30	
	20	27	25	29	=	25.2	— 6.8
	25	20	24	25	=	23.5	— 6.5

EXP. 4.

	P. M. 1.44– 2.44	9.20– 10.20	3–4	8.55– 9.55		Hourly H. P.	Excess or deficit of H. P. on fever days.
H. P.	100.9	101.3	101.0	101.8	=	101.2	
	27	23.2	19	25	=	23	
	102.1	101.4	101.4	100.8	=	101.4	
	23.2	17.6	22	20	=	20.7	
	102.3	100.2	101.3	102.1	=	101.4	
	22.9	22	23	20	=	21.9	+ 1.2
	101.7	99.1	98.4	97.1	=	99.0	
	19	17	20	25	=	20.2	— .5

						Hourly H. D.	Excess or deficit of H. D. on fever days.
H. D.	25	25	18	22	=	22	
	22	18	25	20	=	21	
	22	20	25	25	=	23	+ 2
	22	14	22	25	=	20.7	

EXP. 5.

	A. M. 8.10–9–10	1.45 2.45	8.15–9.15	12.45–1.45		Hourly H. P.	Excess or deficit of H. P. on fever days.
H. P.	101.9	102.5	102.1	102.1			
	31	35	28	27			
	101.7	101.4	101.9	102.0	=	101.7	
	18	22			=	20	
	102	103.6			=	102.8	
	17	25			=	21	+ 1

						Hourly H. D.	Excess or deficit on fever days.
H. D	27	31	27	27	=		
	25	27			=	26	
	22	20			=	21	— 5

EXP. 6.

	A. M. 8.55–9.55	9.57–10.57	11–12	2–3	4–5	8.05–9.05	8.05–9.05		Hourly H. P.	Excess or deficit of H. P.
Hunger Day. H. P.	100.2	100.3	101.0	100.6	100.6	100.9	101.9	=	100.6	
	33	25	23	28	27	23	23	=	27	
	101.5	102.3	101.8	100	99.9			=	100.9	
	28	26	24	27	17			=	23	— 4

									Hourly H. D.	Excess or deficit of H. D.
H. D.	33	22	25	27	25	25	27	=	26	
	25	29	27	29	16			=	25	— 1.

EXP. 7.

	A. M. 8.45–9.45	9.50–10.50	10.55–11.55	2.05–3.05	4–5	8.05–9.05	7.52–8.52		Hourly H. P.	Excess or deficit of H. P.
Hunger Day. H. P.	100.6	100	99.7	100.6	101.4	102.4	100.6	=	100.7	
	29	20	21	24	16	25	21	=	22.2	
	100.2	102	102.6	104.3	102.8	103	101.1	=	102.2	
	27	20	21	27	29	20	20	=	23.4	+ 1.2
	100.3	103.5	103.7	105.1	102.9	103.8	100.6	=	102.8	
	22	21	16	22	20	12	11	=	18	— 4.2

									Hourly H. D.	Excess or deficit of H. D.
H. D.	31	20	20	20	16	27	20	=	22	
	22	18	18	33	31	25	22	=	24.1	+ 2.1
	14	20	20	25	25	16	12	=	18	— .4

EXP. 8.

	A. M. 9-10	10.05–11.05	11.08–12.08	2.10–3.10	4.10–5.10	8.15–9.15	8–9		Hourly H. P.	Excess or deficit of H. P.
H. P.	101.	99.8	99.1	101.4	101	101.1	100.4	=	100.5	
	14	16	17	16	15	17	13	=	15.4	
	100.2	101.4	103.8	105.2	103.9	102.6	101.6	=	102.6	
	24	28	22	17	17	16	20	=	20.5	+ 5.1
	102.2	105.4	101.4	102.3	101.8	101.9	101.1	=	102.7	
	28	13	19	16	20	19	9	=	17.8	+ 2.4

									Hourly H.P.	Excess or deficit of H. D.
H. D.	18	18	16	20	16	16	14	=	16.8	
	20	20	18	20	18	16	18	=	17.1	+ 3
	18	16	20	18	20	16	10	=	16.5	— 3

EXP. 10.—Cat.

First Hunger Day.

A. M.	A. T.	C. T.	E. T.	R. T.	
10.10	70.	74.4	22.1	101.1	Weight 5.6 Litres 77.5
11.10	78.	75.15	26.1	100.4	
	H. P. = 28.84		H. D. = 31.29		
11.19	2 gtt. of putrid blood seven days old, per jugular.				
11.20	78.	75.2	25.6	100.4	Litres 105.0
12.20	78.	76.0	25.8	102.3	
	H. P. = 37.55		H. D. = 33.37		
12.24	78.	76.	25.8	102.3	Litres 92.50
12.24	79.5	76.75	26.8	102.5	
	H. P. = 32.21		H. D. = 31.29		
1.32	79.5	76.8	26.3	102.5	Weight 5.48 Litres 70.0
2.32	79.1	77.3	26.2	104.4	
	H. P. = 29.50		H. D. = 20.86		
2.40	79.5	77.4	26.3	104.4	Litres 106.0
3.40	79.5	78.1	26.6	104.8	
	H. P. = 31.01		H. D. = 29.20		
3.45	79.5	78.1	26.6	104.8	Litres 90.0
4.45	79.8	78.8	26.8	104.0	
	H. P. = 25.56		H. D. = 29.20		

EXP. 11.—Rabbit. Cortex cerebri removed.

P. M.		R. T.
3.34		101.8
3.35	2 gtt. of putrid blood, per jugular.	
4.05		101.6
5.20		105 4
5.55		102.4
7.00		101.6

Second Day.

A. M.		
8.45		103.0
8.47	1 gtt. of blood, per jugular.	
9.10		102.8
9.33		103.0
10.07		103.4
11.35		104.1
12.07		103.0

Upon autopsy, a large part of the cortex was found to be destroyed.

EXP. 12.—Rabbit. Cortex removed.

P. M.		R. T.
1.24		103.7
1.45	2 gtt. of putrid blood, per jugular.	
1.54		106.1
2.42		105.7
4.00		106.0

At autopsy, a large part of cortex cerebri destroyed.

EXP. 13.—Rabbit. Anterior end of corpora striata destroyed.

P. M.		R. T.
1.40		104.8
2.15	¼ gtt. of putrid blood, per jugular.	
2.45	½ gtt. " " "	105.1
2.47		106.3
4.15		105.3
5.00		105.2
6.20		104.8

EXP. 14.—Rabbit. Corpora striata removed.

P. M.		R. T.
4.45		103.4
5.35	¼ gtt. of putrid blood, per jugular	103.6
6.00		103.8
6 20		103.6
6.50	½ gtt. of putrid blood, per jugular	103 9
7.05		103.6
7.25		102.9
7.45		102.0
8.10		102.4

EXP. 15.—Rabbit. Anterior ends of corpora striata removed.

P. M.		R. T.
12.45		103.2
1.42	¼ gtt. of putrid blood, per jugular.	
2.10		103.4
3.00		105.2
3.25		106.4
4.10		106.6
		106.2

EXP. 16.—Rabbit. Corpora striata removed.

A. M.		R. T.
11 50		103.8
12.40	¼ gtt. of putrid blood, per jugular	102.8
1.05		102.1

EXP. 17.—Rabbit. Corpora striata removed.

P. M.		R. T.
5.42		103.9
5.49	1 gtt. of putrid blood, per jugular.	
6.15		102.8
6.45		102.6
8.10		100.8